

# **Leading By Example Council Meeting**

**January 13, 2015**

# Agenda



- Welcome and Introductions
- State Policy Updates
- Vehicles
- Mass. as First Customer
- LBE Updates
- Financing Opportunities
- DCAMM Updates
- Communications
- Lyman Estate Overview & Tour

# State Policy Updates

# New Administration Transition - EOEEA

- Matthew Beaton - Secretary, Executive Office of Energy and Environmental Affairs
- Martin Suuberg – Commissioner, MassDEP
- John Lebeaux - Commissioner, Department of Agricultural Resources
- Dan Burgess – Interim Commissioner, DOER
- John Murray – Interim Commissioner, DCR
- Stay tuned for policy and program priorities

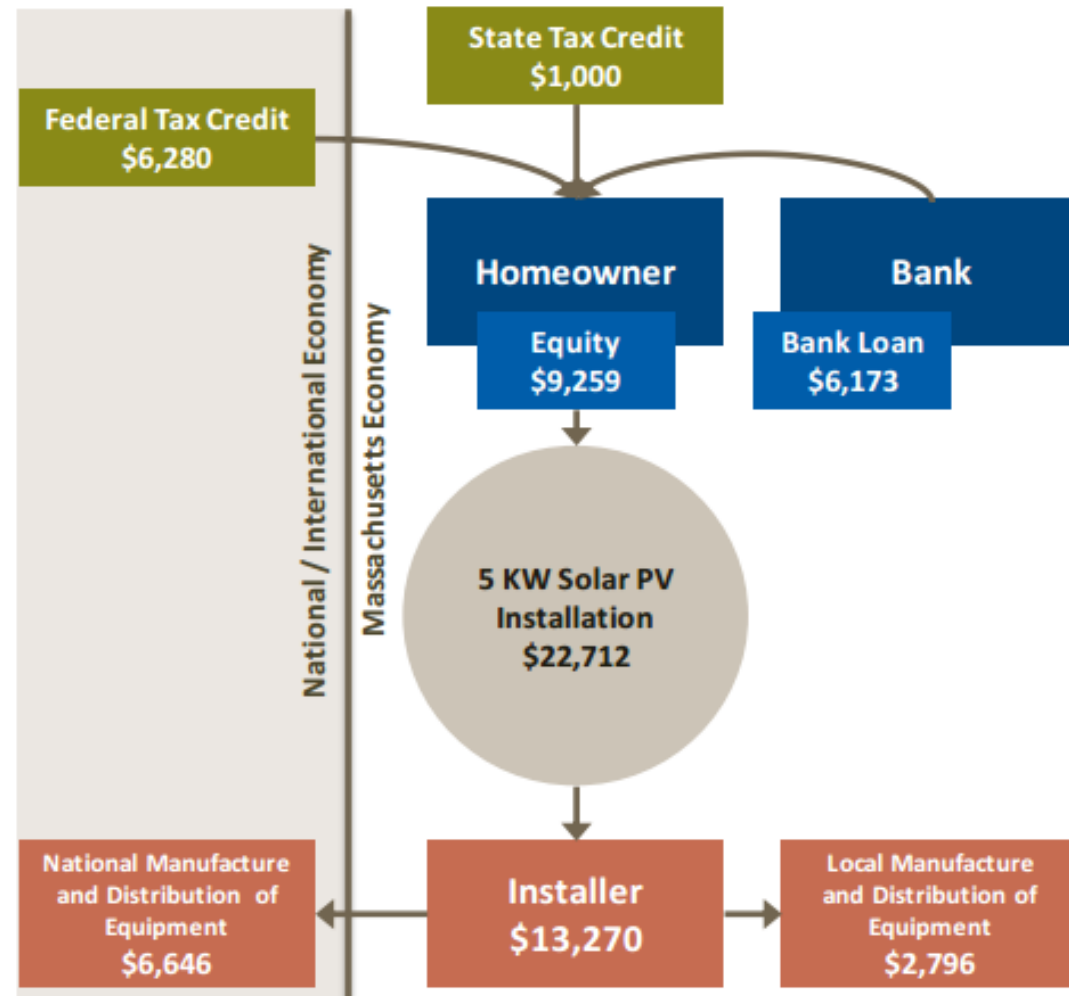


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# Solar Loan Program

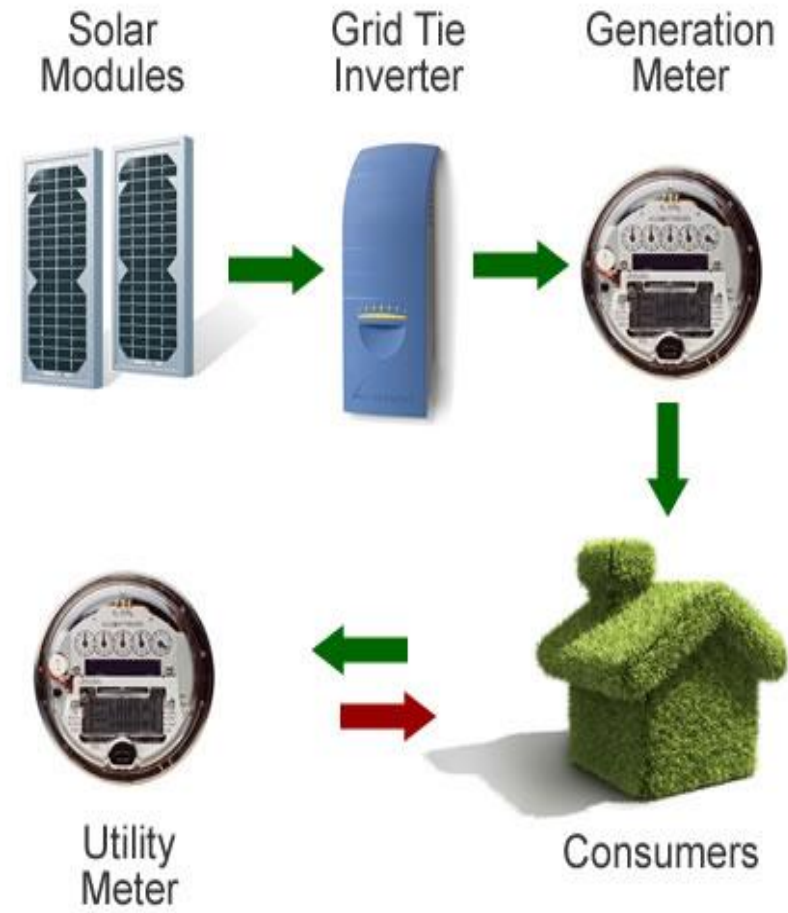
- \$30 million lower interest solar PV loan program for consumers
- Homes up to 3 units and community shared solar
- Promote system ownership
- Combine with tax credits and SRECs
- Loans start Spring 2015 through local lenders

Figure 1. Direct Ownership - Construction Phase Cash Flows



# Net Metering Stakeholder Group

- 17 member Task Force to analyze and report on how best to reach state's 1600 MW solar goal
- Task Force report due 3/31/2015
- Public comments and questions:  
[NMS.taskforce@massmail.state.ma.us](mailto:NMS.taskforce@massmail.state.ma.us)



# Resiliency Grants

**Goal is to continue to supply heat, water, cooking equipment and life safety services that require electricity for up to 100 hours after a natural disaster.**

**\$18.4 million awarded**

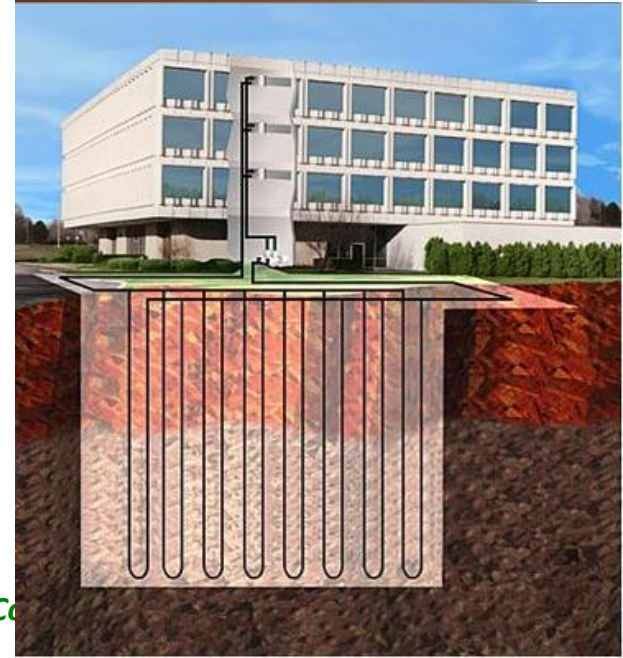
- *Barnstable*
- *Boston*
- *Cambridge*
- *Cape & Vineyard Elec*
- *Chelmsford*
- *Lawrence Sanitary Dist.*
- *Greenfield*
- *Holyoke*
- *Medford*
- *MAPC – Beverly*
- *MAPC – Wayland*
- *Northampton*
- *Sterling*



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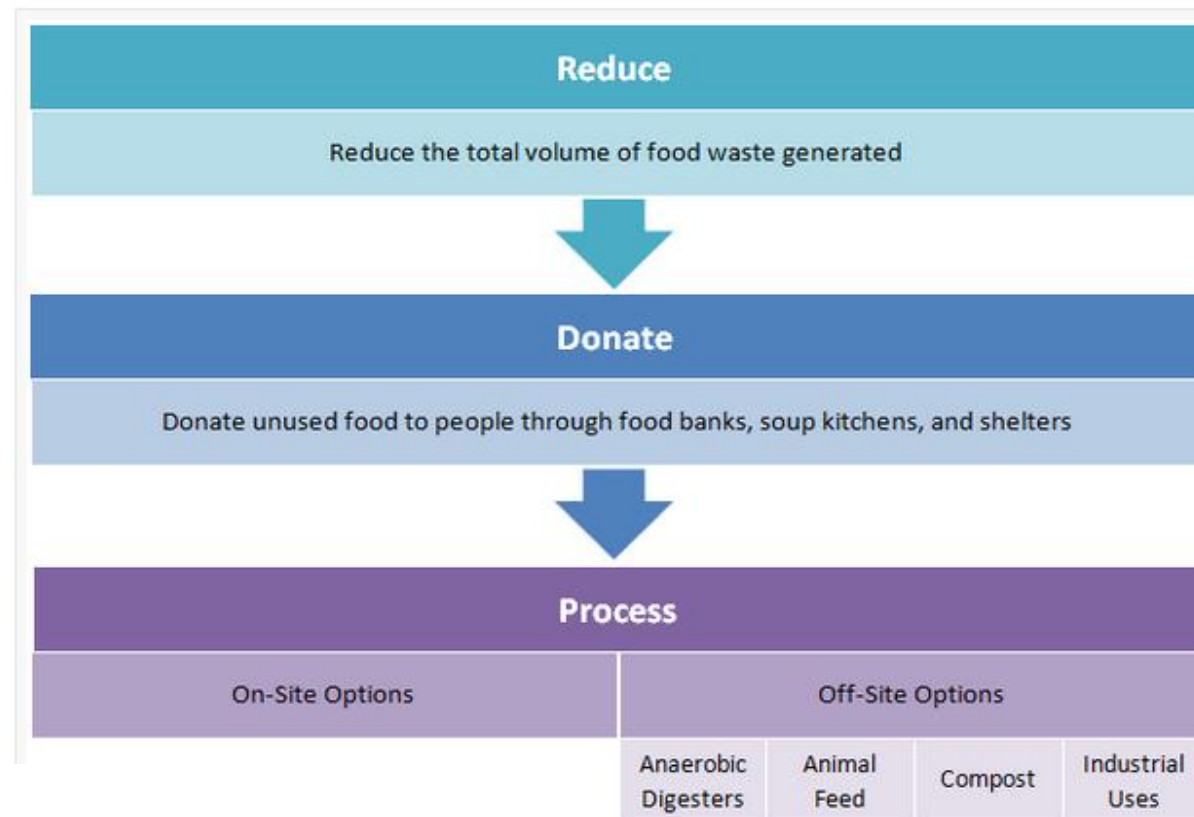
# Renewable Thermal APS Standards

- DOER is preparing draft regulations to add Renewable Thermal to Alternative Portfolio Standards
- Goal to provide Alternative Energy Credits to renewable thermal technologies
- Expected to be eligible for systems put in service on or after 1/1/15
- Final regulations expected Summer 2015



# Organics Waste Ban

- Businesses and institutions disposing more than 1 ton of food waste per week must divert it from landfill
- Implementation started October 1, 2014
- RecyclingWorks is working with 15 state facilities
- Goal is to divert 35% of state's food waste by 2020



(Table: RecyclingWorks MA)

# Vehicles

# Fuel Efficiency Standard for State Fleet

- Released by OSD, in collaboration w/DOER & MassDEP
- Created to fulfill a number of legislative, regulatory and environmental commitments
- Effective January 1, 2015
- **Covered Vehicles**
  - All new light duty vehicle acquisitions made through the Office of Vehicle Management
  - All new light duty vehicle acquisitions made by Executive branch state agencies (regardless of acquisition method)
  - Exemptions:
    - Authorized emergency vehicles
    - Vehicles weighing more than 10,000 lbs



# Minimum Requirements

- MPG Requirements:

Vehicle Category	Minimum Combined MPG
Passenger Cars (Category I Vehicles)	32 MPG
Trucks, Vans and SUVs (Category II Vehicles)	22 MPG

- Electric Vehicles

Fiscal Year	2015	2016	2017	2018	2019	2020
% PHEV/BEV Required*	10%	13%	16%	19%	22%	25%

*\*Applies only to vehicle purchases where BEV/PHEV options are available*

- Hybrid and Alternative Fuel Vehicles (AFVs)

Fiscal Year	2015	2016	2017	2018	2019	2020
% Hybrid/AFVs Required*	5%	7.5%	10%	12.5%	15%	15%

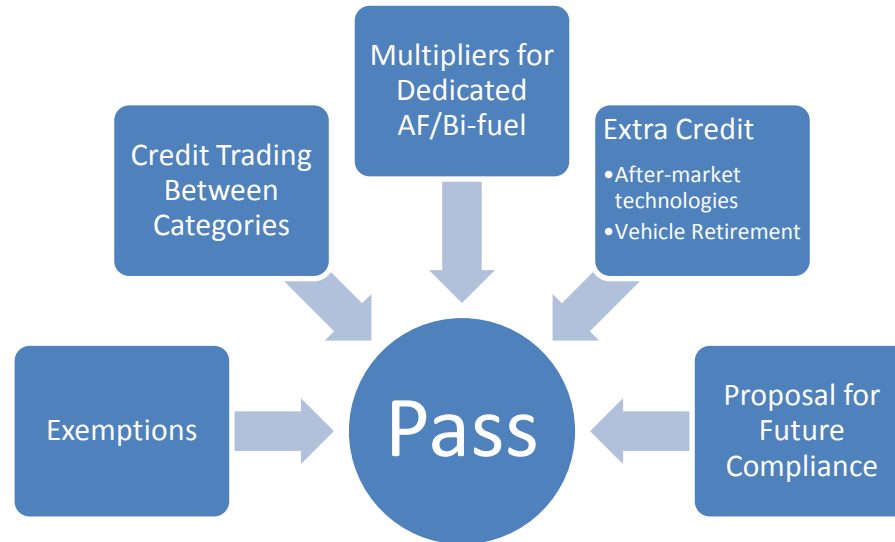
*\*Applies to all annual agency fleet purchases*



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# Additional Standard Details

- Flexibility in Compliance



- Green Fleet Committee

- Representation from agency fleets, OVM, DOER, MassDEP, MA Clean Cities, EV Task Force
- Semi-Annual Meetings to review/revise standard

# FES Standard Roll-Out Events

- Resources Available
  - Guidance Document
  - Fuel Efficiency Standard Calculator

- Green Fleet Committee Kick-Off: January 15<sup>th</sup>

- Fleet Manager Information Session

- Friday, January 30<sup>th</sup> – 9:30 -noon, 495/MetroWest Partnership
  - Thursday, February 5<sup>th</sup> – 11:30 – 1 pm, Webinar

## Compliance with the Standard

[Instructions](#)

Category I: Passenger Cars		Category II: Pickups/SUVs/Vans	
Number of Vehicles Acquired	14	Number of Vehicles Acquired	21
Average Combined MPG	30.6	Average Combined MPG	22.1
Avg. Combined MPG with Credits	30.7	Avg. Combined MPG with Credits	22.6
Standard MPG	32	Standard MPG	22
Category I Score	Fail	Category II Score	Pass
Overall MPG Standard Score		Pass	
		Total Differential	0.14 MPG
BEV/PHEV Purchasing Requirement		AFV/Hybrid Purchasing Requirement	
Number of Vehicles	14	Total Vehicles, Incl. After Market Conversions	37
BEV/PHEV Requirement	1	AFV/Hybrid Requirement	2
BEVs/PHEVs Acquired	2	AFVs/Hybrids Acquired	10
Score	Pass	Score	Pass



This fuel efficiency calculator was developed by the Department of Energy Resources. For more information, please contact Jillian DiMedio, [jillian.dimedio@state.ma.us](mailto:jillian.dimedio@state.ma.us), (617) 626-7367

# EV/EVSE Funding Programs

- MassDEP offers two programs for state agencies, available on first come, first served basis:

Program	Eligible Entity	PHEV Incentive	BEV Incentive	Level 2 Charging Station		
				1-2 BEVs	3-4 BEVs	5+ BEVs
MassEVIP III	Municipality, Public University/ College, State Fleet, Public Driving School	\$5,000	\$7,500	\$7,500	\$10,500	\$13,500
Workplace Charging	Employers with $\geq 15$ employees in non-residential place of business	n/a	n/a	50% of hardware costs for Level 1 or Level 2 Station (up to \$25K) *one per location but can submit applications for multiple locations		

# ***Massachusetts as a First Customer Pilot Program***

**Presentation for LBE Council Meeting  
January 13, 2015**

# Massachusetts as a First Customer Pilot Program

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## Program Objectives:

- Support innovative Massachusetts clean energy and water technology companies that are seeking a first or early-customer to validate the commercial readiness of their technologies.
- Facilitate and incentivize the adoption of technologies by public entities (state agencies, quasi-state agencies, authorities, public academic institutions, and municipalities) that are open to being a first or early user.

## Program Overview:

- \$1,000,000 (\$800,000 to provide financial incentives, \$200,000 for technical assistance and Expo)
- Two-Phased Approach
  - First Phase: Cleantech Expo & CRT List
  - Second Phase: Solicitation for Applications

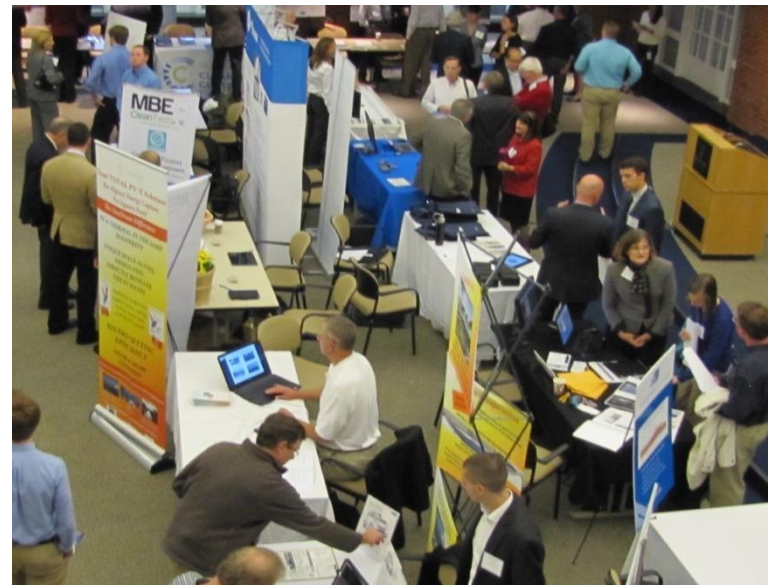
# Phase 1: Massachusetts as a First Customer Cleantech Expo

## October 1, 2014

Sponsored by MassCEC, the Massachusetts Department of Energy Resources and Bentley University

A chance for MA based companies with innovative clean energy and water technologies to interact with purchasers and representatives of public agencies, authorities, municipalities and public colleges in an effort to explore potential partnerships and purchasing relationships.

- **24** companies exhibited
- Over **100** representatives from public entities, municipalities and public colleges attended
- Representatives from **DOER**, **OSD** and **DCAMM** served as resources for attendees and companies regarding state procurement laws



# Massachusetts as a First Customer Cleantech Expo



# Phase 1: Commercially Ready Technology (CRT) List

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- **Goal:** Provide representatives and purchasers of Public Entities with a faster understanding of which products and technologies are ready for the commercial market.
- MassCEC worked with a third-party technical expert to analyze the Technology Readiness Level (TRL)\* of the products and technologies of companies that showcased at the Expo.
- Those technologies & products deemed ready for the commercial market with limited functional risk were placed on a Commercial Ready Technologies (CRT) List and distributed to attendees.
- Only CRT-listed technologies will be eligible to apply for Phase 2 of the Program, however, MassCEC will continue to maintain the CRT List on its website and accept applications for CRT review on a rolling basis.

*\* Technology Readiness Level (TRL) is a metric used for describing a technology's maturity. The TRL calculator used for this Program was developed by the New York State Energy Research and Development Authority (NYSERDA) based on the TRL systems developed by NASA and the U.S. Department of Energy.*

# Phase 2: Solicitation for Applications

*(Target release date: January 14, 2015)*

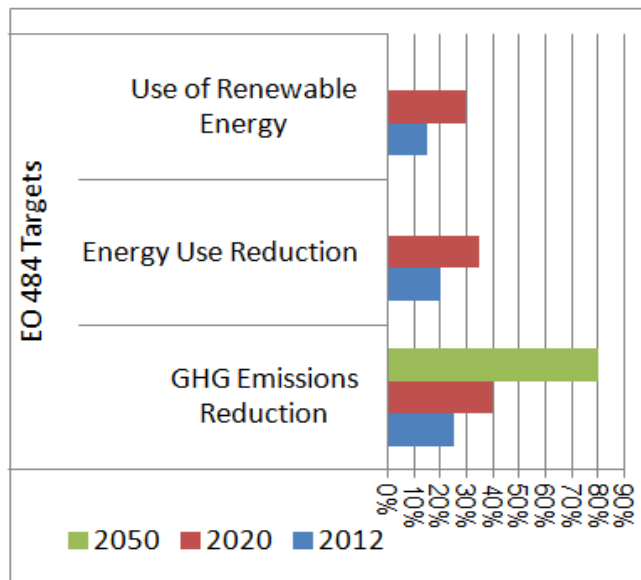
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- Through Phase 2, MassCEC will play a key role in:
  - a) Helping selected Applicants identify target Customers and navigate relevant procurement hurdles;
  - b) Enhancing the productivity of interactions between Public Entities and selected Applicants; and
  - c) Providing technical and financial assistance to incentivize the procurement of selected Applicant technologies by Public Entities.
- Eligible Applicants:
  - Companies who have a technology/product that is CRT-listed
- MassCEC Assistance:
  - “Connector”
  - Technical Assistance
  - Grants

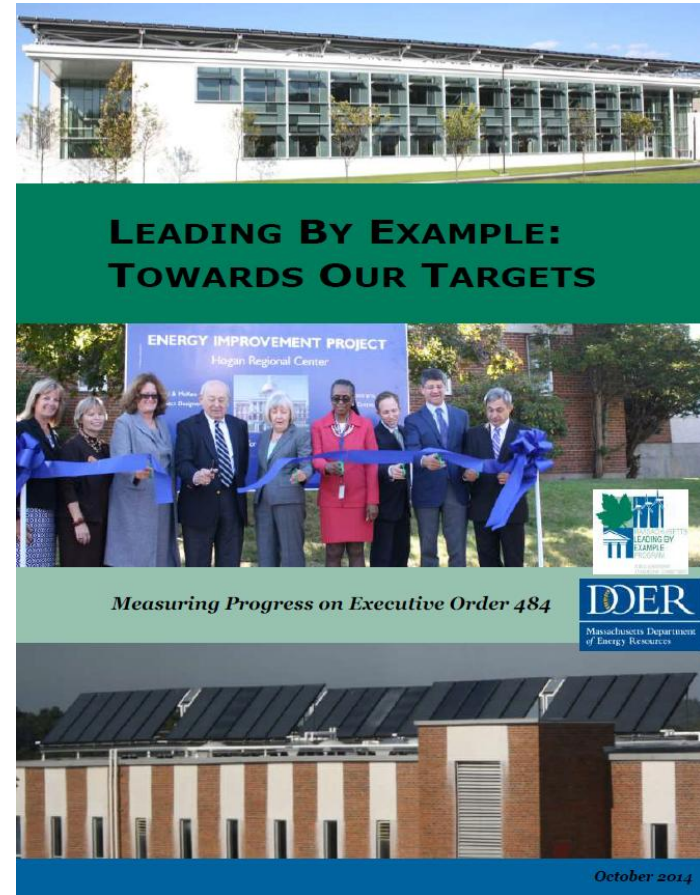
# LBE Updates

# LBE Progress Report

- Report mailed to Secretaries, Legislature, Chancellors, Higher Education Presidents, and LBE Partners.
- EO 484 Targets:



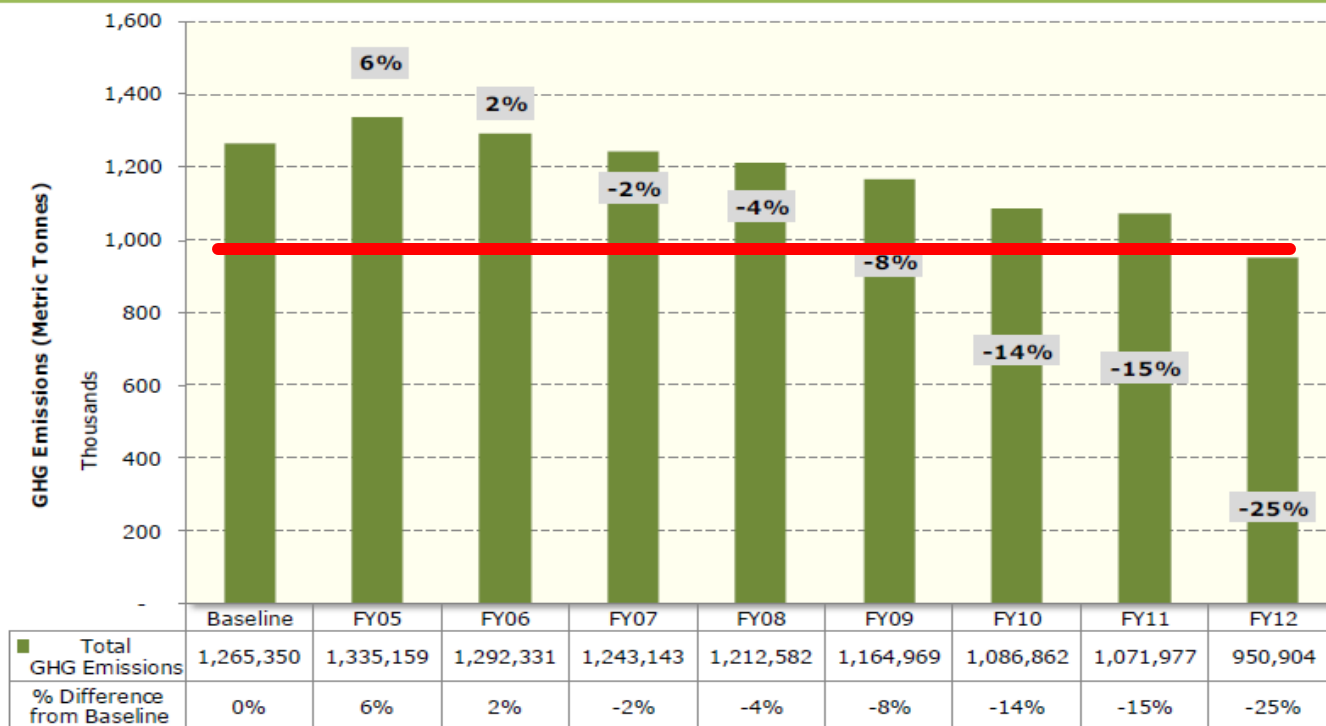
[www.mass.gov/energy/lbepprogressreport](http://www.mass.gov/energy/lbepprogressreport)



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# LBE Success: GHG Emissions



**Figure 4: Annual Change in GHG Emissions, Baseline Year to FY12**

Overall GHG emissions have decreased 25 percent from the LBE Baseline through FY12, reducing overall emissions by some 314,000 metric tons.

Achieved 25% reduction in GHG emissions in 2012

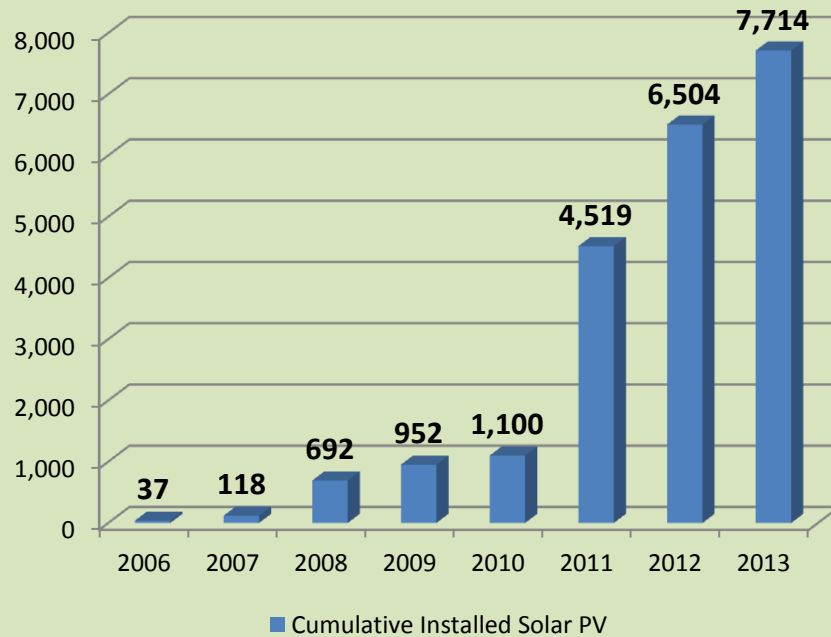


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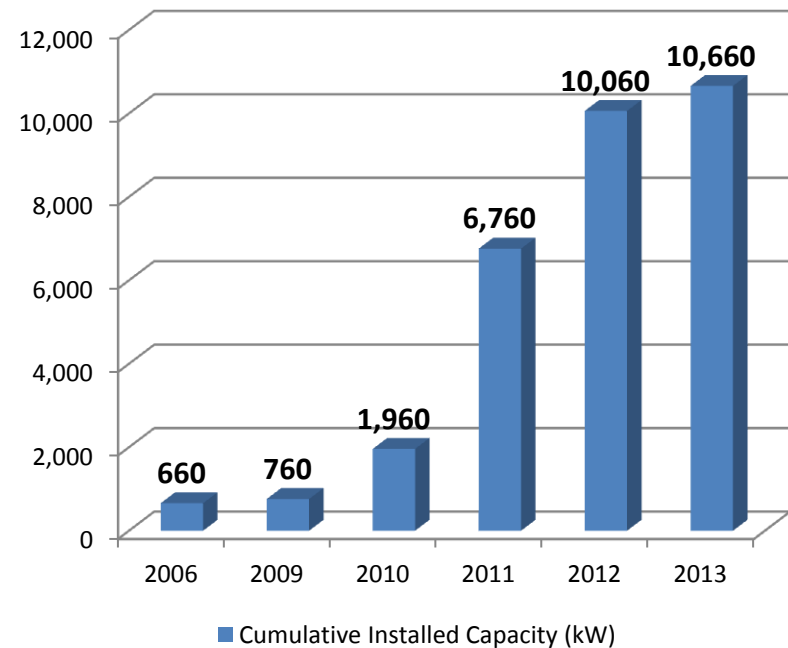
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# LBE Success: Solar and Wind

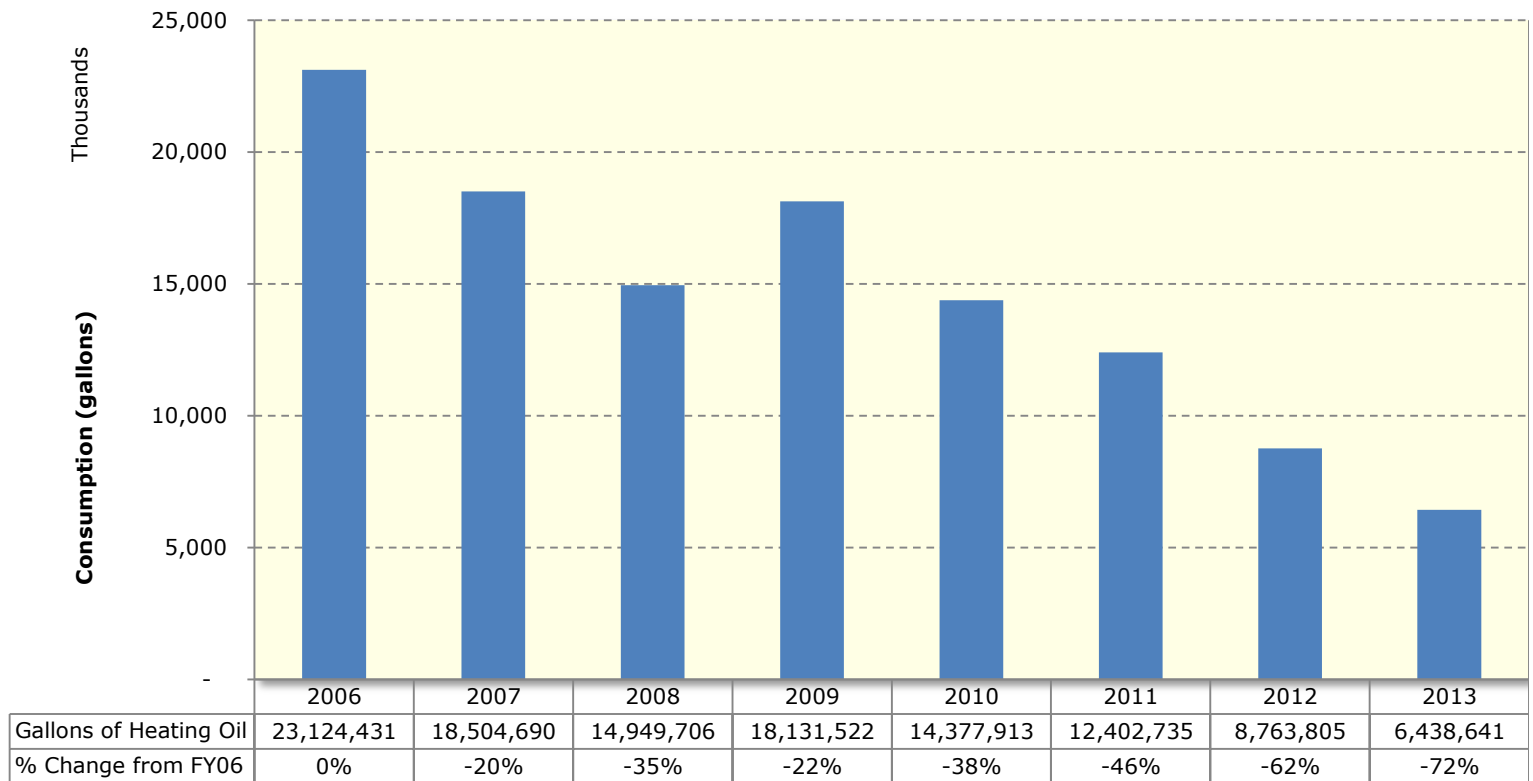
## Installed Solar PV at State Facilities



## Installed Wind at State Facilities



# LBE Success: Heating Oil Reduction



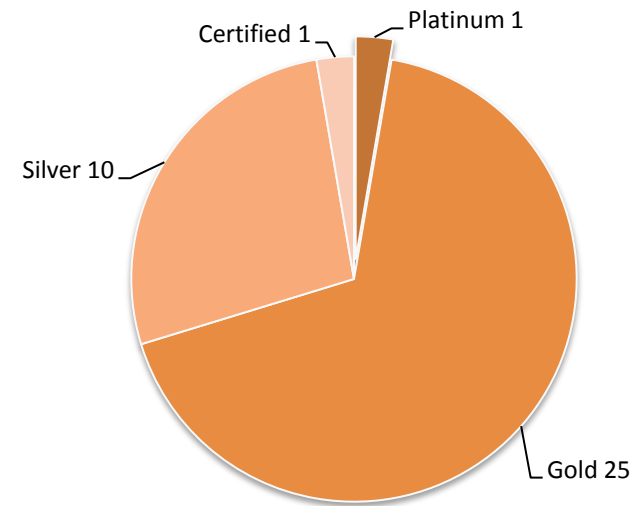
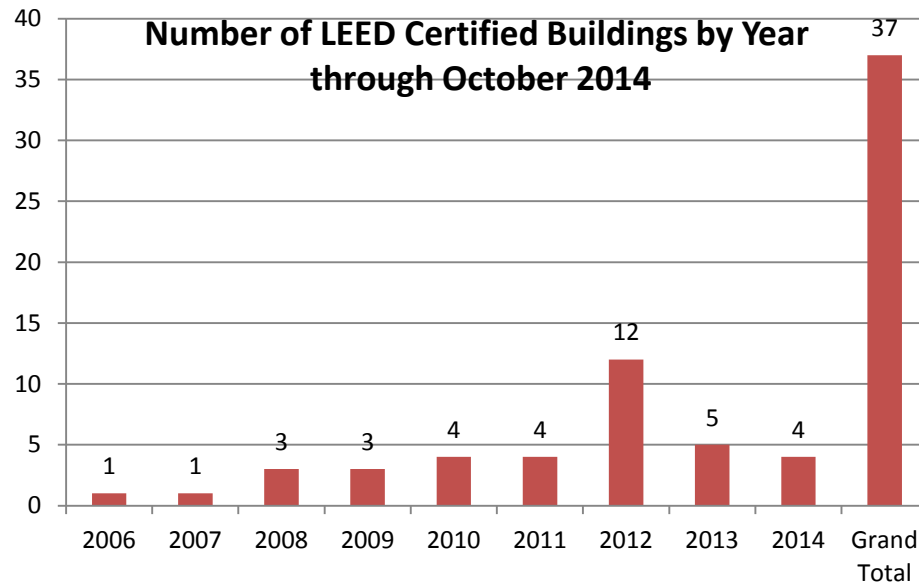
LBE Success: 72% reduction in heating oil 2006-2013



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# LBE Success: New Construction



LBE Success: 37 LEED Certified Buildings throughout Commonwealth, 25 of them Gold

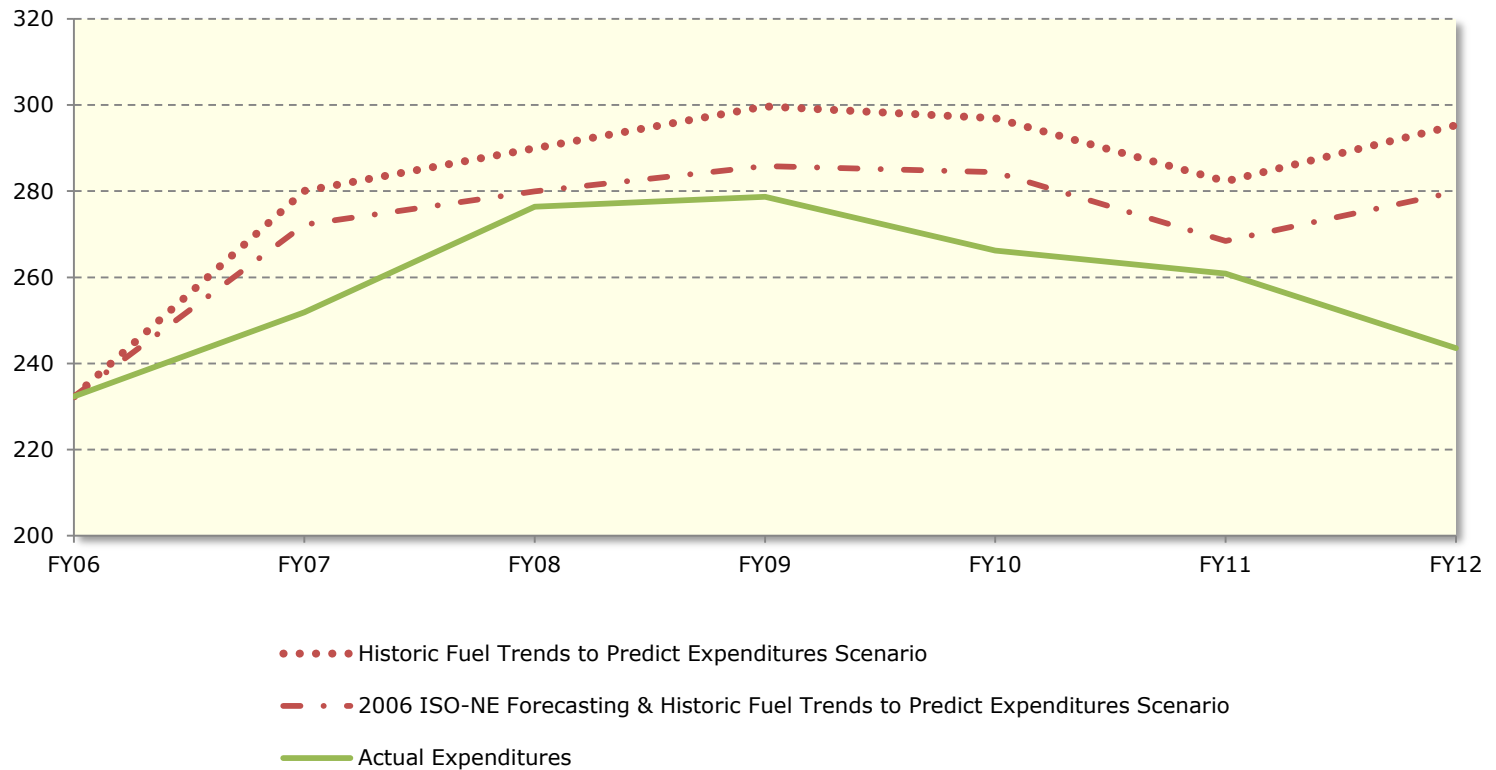
# LBE Success: Zero net energy buildings

ZNEBs in design,  
construction,  
complete

- DFW  
Headquarters in  
Westborough
- North Shore CC
- Bristol CC lab
- DCR Walden  
Pond
- Others in study



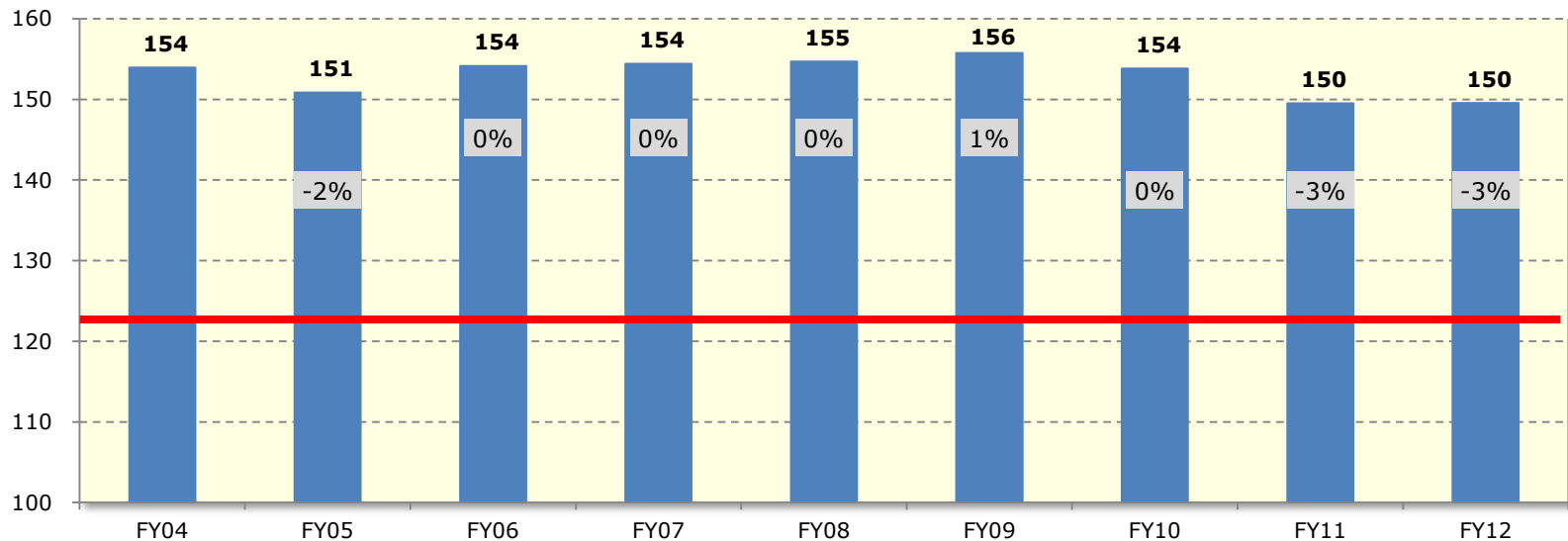
# LBE Success: Cost Savings



Success: Cumulative energy cost avoidance of  
\$93 - \$166 million 2006-2012

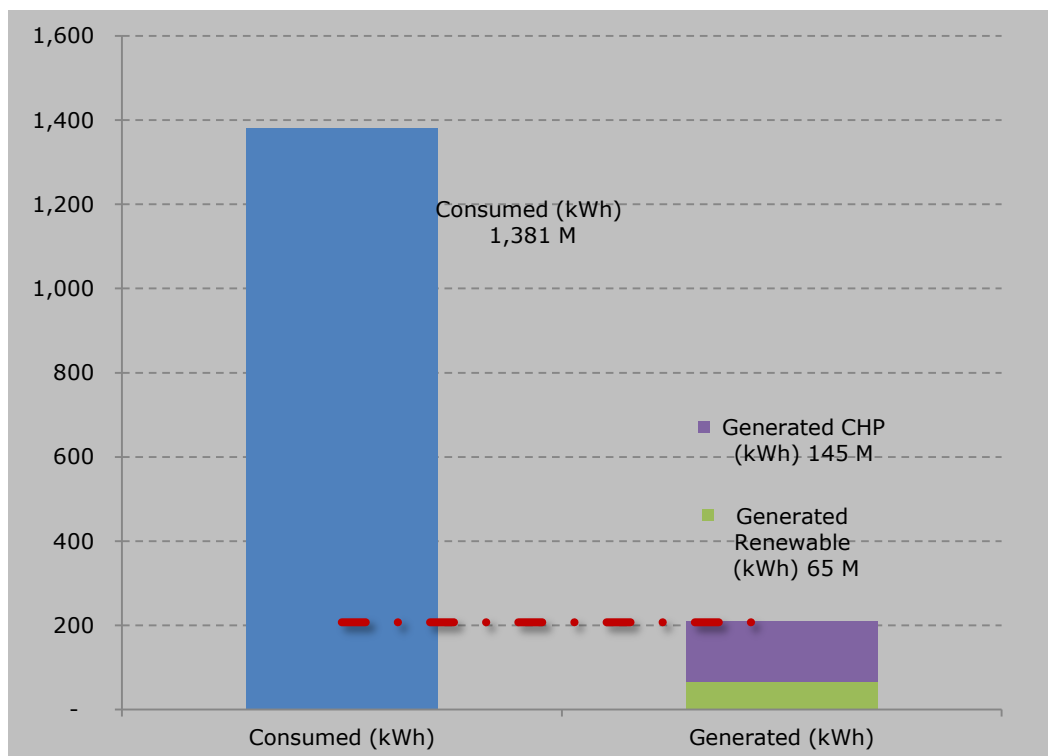


# LBE Challenge: Energy Use Reduction



Only 3% EUI reduction since 2004, well short of 20% target  
How to meet 35% reduction goal by 2020?

# LBE Challenge: Hitting Renewables Targets



15.21% on-site renewable generation but only 4.7% is from renewable

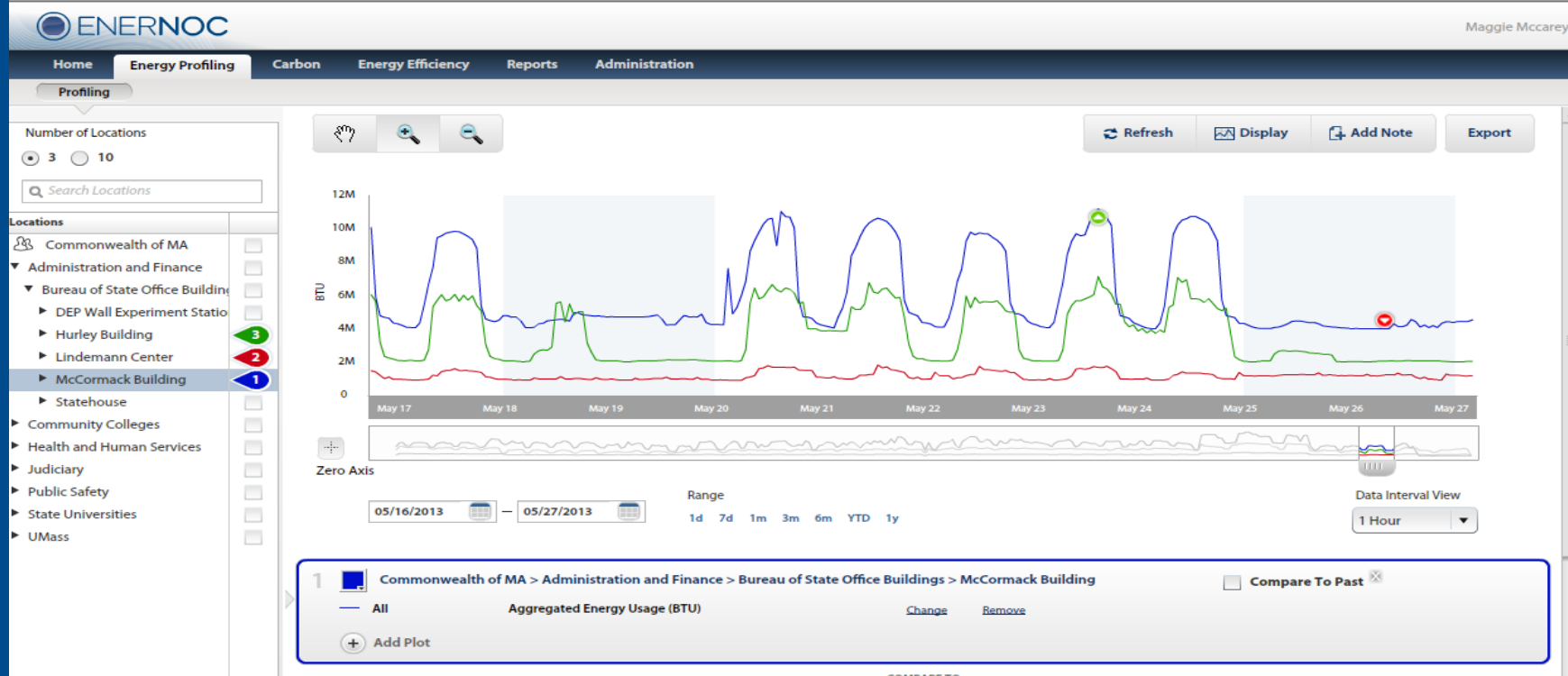
**Challenge:** Meet 30% on-site renewable goal by 2020



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# LBE Challenge: Engaging Occupants



What are the right data tools?  
How to best engage all building users?

# EEMS Contract

- Contract with EnerNOC ends February 2015
- New contract agreement will be at DCAMM
- Currently in research stage with consultant
- Key questions:
  - What are primary goals?
  - Do we track all fuels?
  - What tools other than building meters are available and appropriate?



# LBE Update: Renewable Thermal Grants

## Awarded Grants

- Department of Fish and Game
  - ASHP installation at Shellfish plant, \$44,058 (Plum Island)
  - Biomass installation at Fish Hatchery, \$190,560 (Belchertown)
- Department of Conservation and Recreation, \$202,720
  - 8 Feasibility Studies for biomass and ASHP
  - ASHP installation at Quabbin and Walden Pond
- Trial Court ASHP Feasibility Studies, \$37,600 (Westborough and Uxbridge)
- **Grants still available for studies and implementation**



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# LBE Update: Solar Canopy Grant Program



\$1.5 Million grant opportunity for solar PV at parking lots, garage roofs, and pedestrian walkways on state owned land

- \$0.50/ watt up to \$500,000 per project
- Projects over 200 kW capacity
- All procurement options eligible
- Some on-site state consumption required
- Require minimum # of EV charging stations depending on array size
- Posted on LBE website

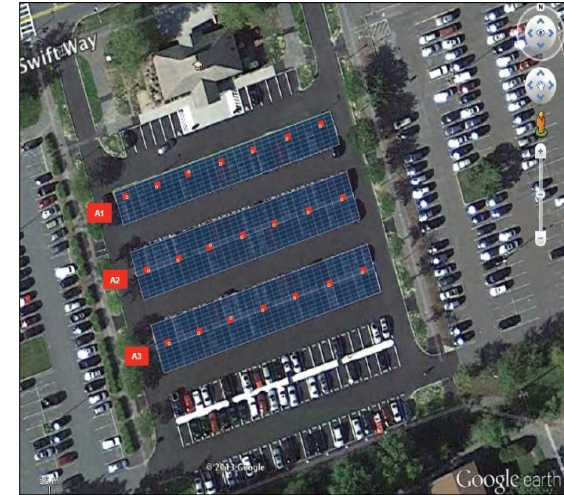


<http://www.mass.gov/eea/grants-and-tech-assistance/guidance-technical-assistance/agencies-and-divisions/doer/doer-procurements.html>

# Solar PV Canopy Awards

## UMass Amherst Visitor Center:

- 292 kW
- \$146,000 in grant funds
- Est. 20 yr savings:
  - \$1.79M, 6.4 M kWh, 2,294 metric tons



## DCR Walden Pond Reservation:

- 100kW
- \$50,000 in grant funds
- Est. 20 yr savings:
  - \$484,845, 2.3 M kWh, 827 metric tons

# DCR Streetlight Project

**Project Goal:** *LED retrofit of approx. 6,000 metered and DCR-owned HPS and MH streetlights*

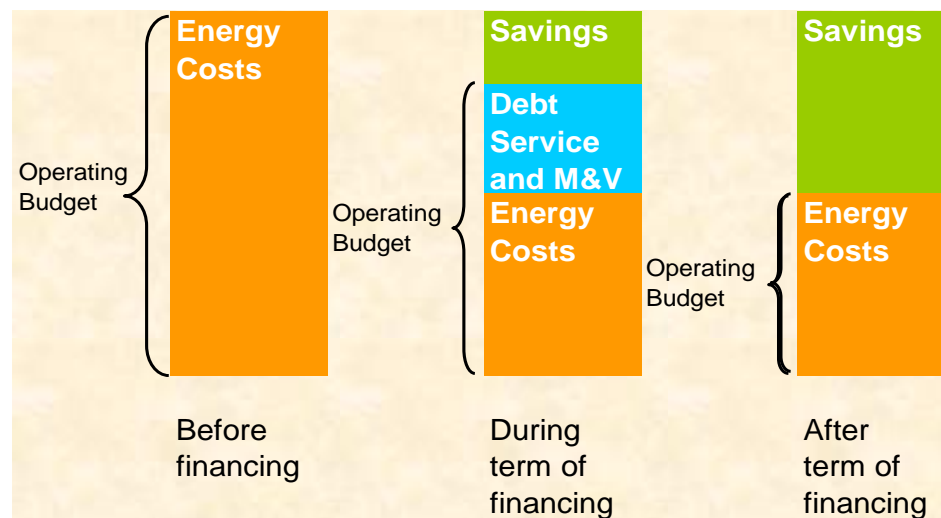
- Phase 1 Currently Underway (To be completed by FY16)
  - Approx. 2,000 streetlights, infrastructure upgrades, pole rewiring
  - Phase 1 Project Cost: \$2.2 million
  - Leveraged Funds
    - Incentives - \$370,000
    - NEEIP Financing - \$1.2 million
  - Savings:
    - 1.5 million kWh/Year
    - \$190,000/year
- Phase 2 – retrofit of remaining 4,000 lights
  - Design in process
  - Construction next Fall



# Financing Opportunities

# Clean Energy Financing – Solar Canopy

- \$15 million allocated over 2 years
  - To target non-building efficiency originally, now looking at PV canopies
  - To supplement or replace upfront capital
- How it works
  - Leverages green bond financing for capital projects
  - Paid for through energy savings or revenue
  - Project must meet savings to debt service ratio of 1.1



# Three Methods for Financing PV Canopies

## 1. Agency Finances, Builds and Owns

- Pros: Most cost-effective Option, agency retains all ownership benefits
- Cons: Large upfront Capital Cost, agency responsible for O&M

## 2. Agency Builds and Owns, Secures Financing Elsewhere

- Pros: Smaller upfront capital cost, agency retains all ownership benefits
- Cons: Upfront capital cost, debt service payments for bond term, agency responsible for O&M

## 3. Third Party Ownership: Power Purchase Agreement (PPA)

- Pros: No up front capital cost, no O&M responsibilities
- Cons: least cost-effective option over time, no benefits of owning system



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# Sample PV Canopy Project: Financial Analysis

Project Details	
System Size	500 kW
Cost/W	\$5.00
Estimated Project Cost	\$2.5 million
LBE Grant Funds	\$250,000
Estimated Annual Generation	578,160 kWh
Estimated Agency Electricity Rate	\$0.16/kWh
PPA Secured Electricity Rate	\$0.13/kWh

	Build to Own	Build to Own w/Financing	PPA
Upfront Cost	\$2,250,000	\$562,500	\$0
Annual Savings from Grid	\$92,506	\$92,506	\$17,345
Average Annual SREC Revenue	\$80,740	\$80,740	\$0
Payback	9 Years	13 Years	n/a
Cumulative Earnings (20 yrs)	\$1.1 million	\$775,000	\$346,896

# DCAMM Updates

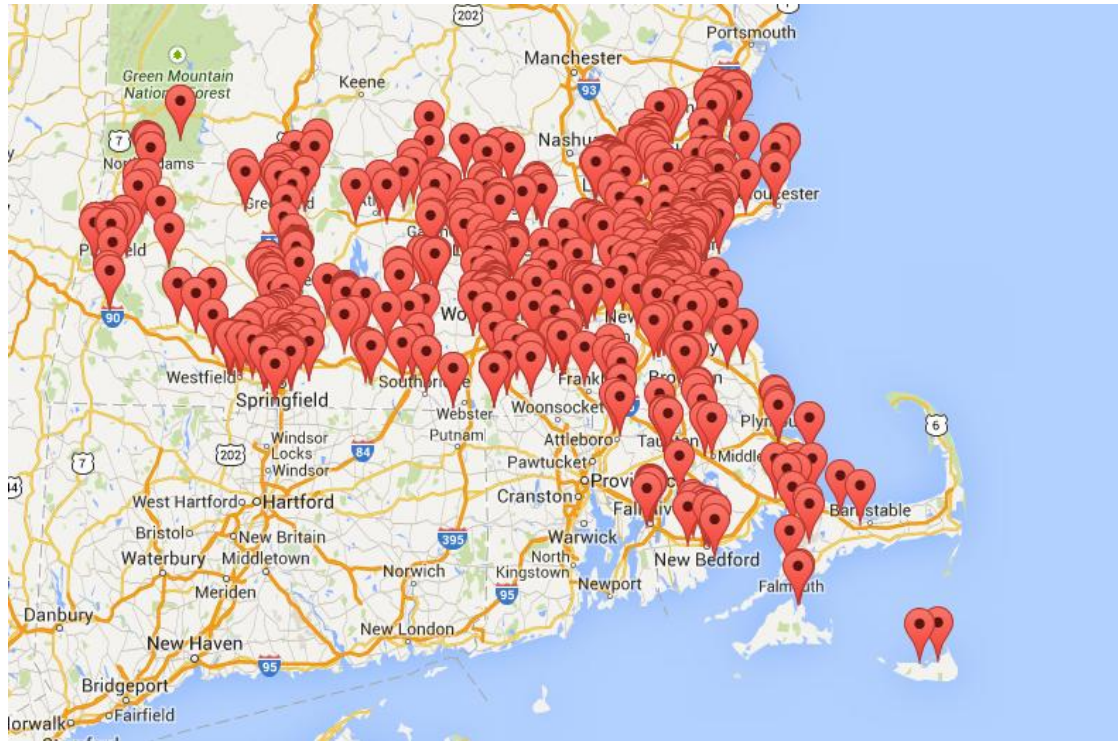
Energy Team



# 2014 Year End Review

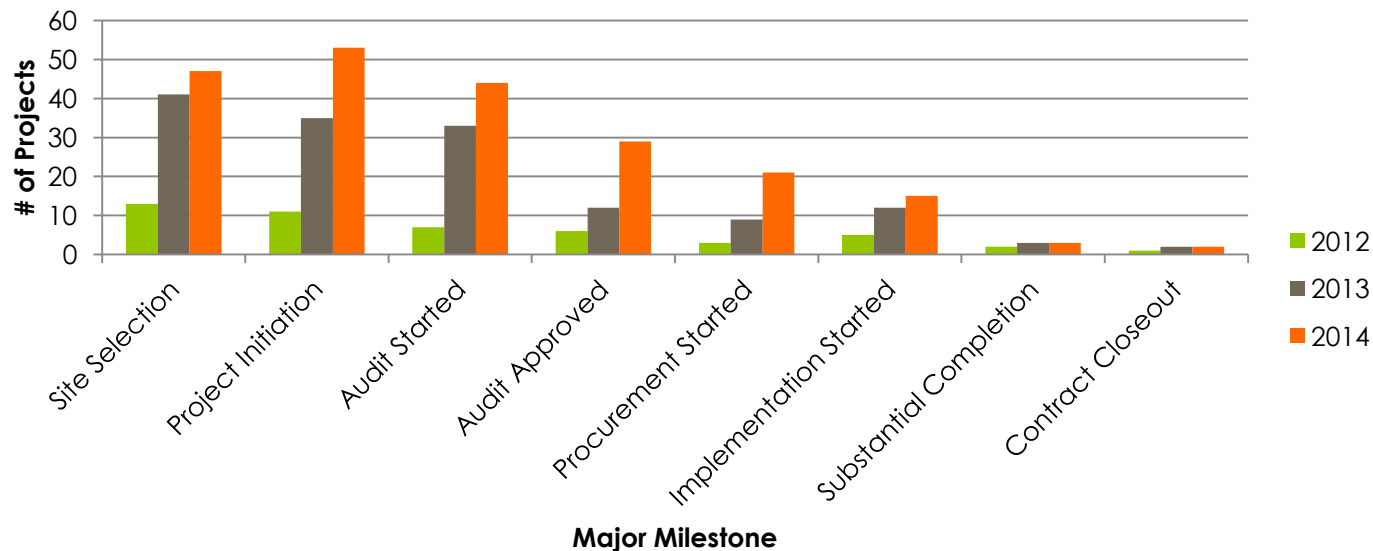
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# 700 Sites in 700 Days



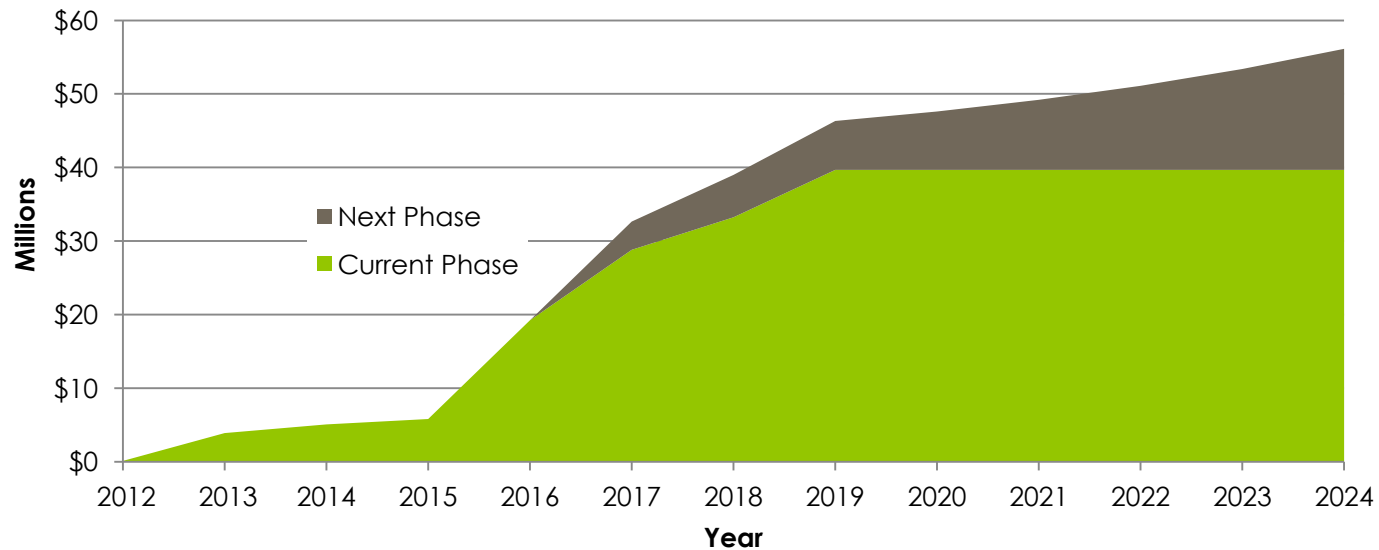
# Milestone Progress

## Milestones Completed: Year by Year Comparison

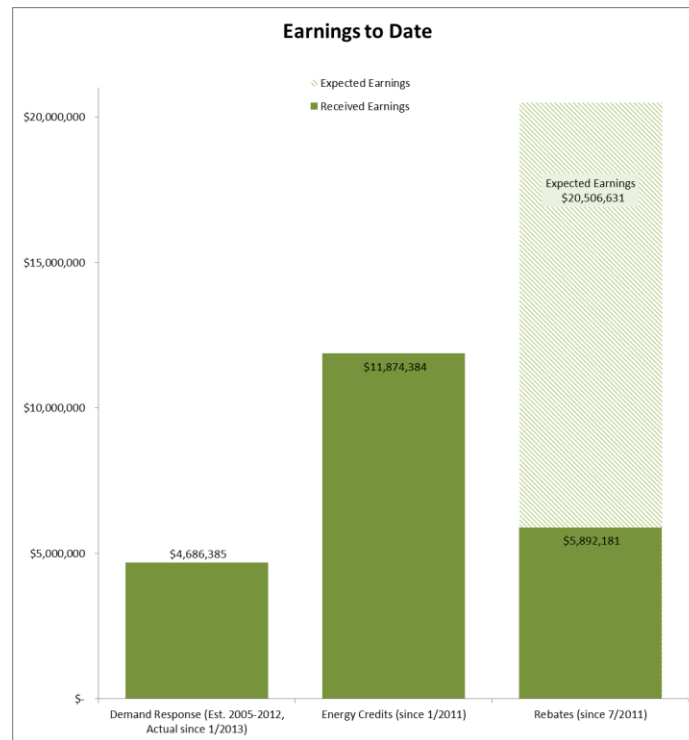


# Energy Savings \$

## Energy Projects: Commonwealth Annual Savings



# Earnings to Date



# Happy Clients

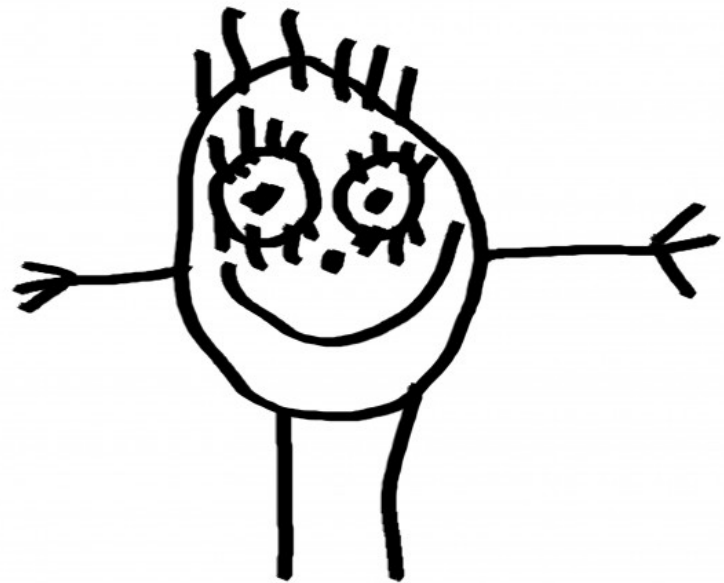
**“Being involved with the AEP proved to be both fun and profitable for BSH.**

**Plus..... they have the “best people” energy planners to the director.”**

*Don Zanetti*

*Project manager*

*Bureau of the State House*



# What's Next?

- Complete what we've started
- Sustainable
- Reliable
- Maintainable
- Toward Zero Net Energy
- Renewable
- Continuous Commissioning
- ??????????



# Commonwealth Facility Fund for Energy Efficiency

Project Contact:

Ryan Harold

DCAMM

857-204-1449

[ryan.harold@state.ma.us](mailto:ryan.harold@state.ma.us)



Division of Capital Asset Management and Maintenance

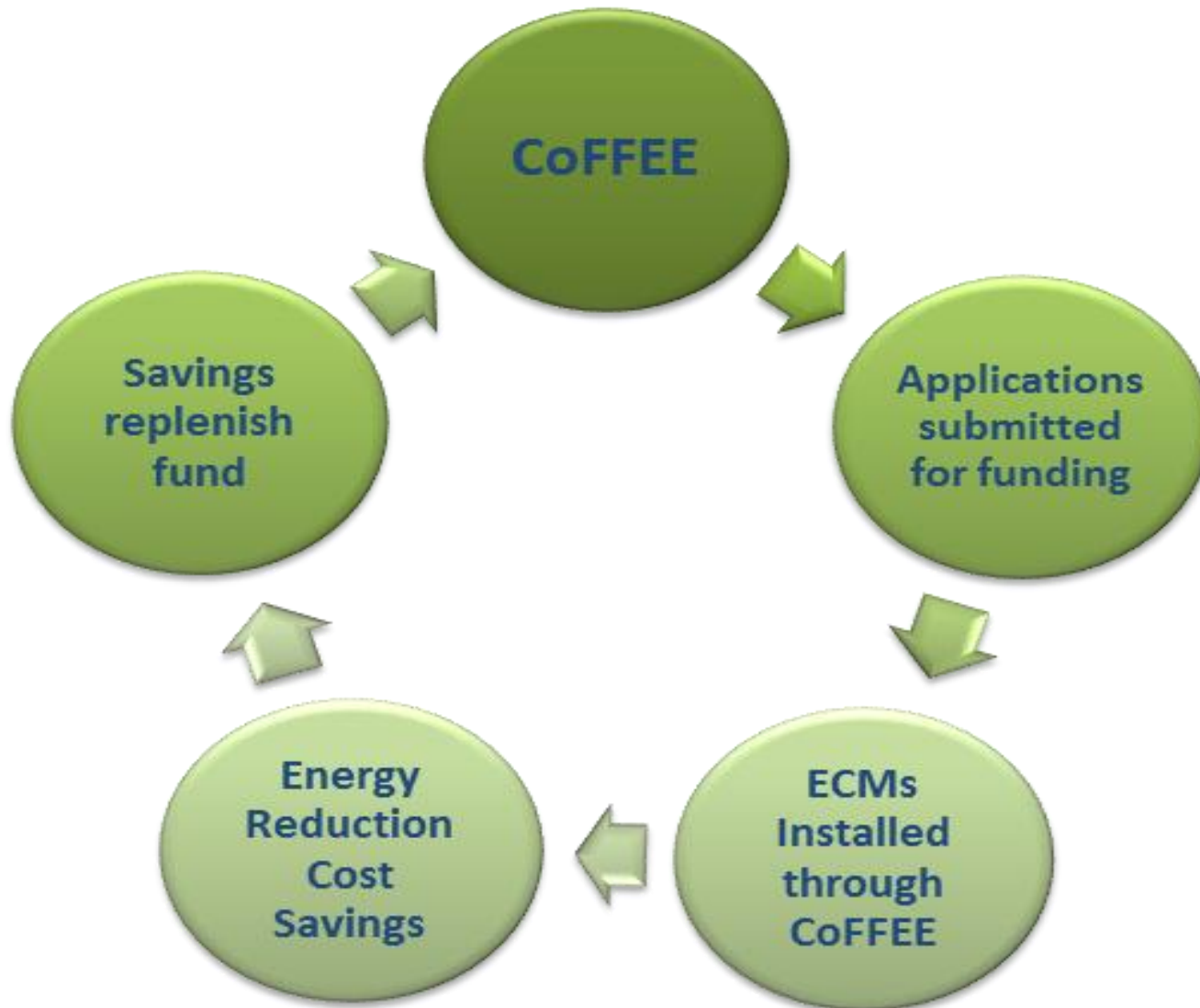
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## CoFFEE Background

- How a state revolving loan fund concept could be applied to the State's buildings energy efficiency projects
- Need to identify a appropriate and cost-efficient way to finance **short term projects**
- Small scale projects can be **implemented quickly** and result in immediate savings that can then be **re-invested in additional efficiency** projects
- DCAMM/DOER awarded Dept. of Energy grant  
Federal grant: \$254,000    DCAMM seed money: \$500,000

# CoFFEE Process





## CoFFEE Benefits

### Savings

- Provide funds to state facilities to finance efficiency projects
- Small administration fee to sustain management of the fund
- Savings to exceed debt 15% of savings staying with facility

### Flexible

- Varied repayment terms based on specific project paybacks
- Fund multiple ECMs projects
- Fosters energy and water efficiency and innovative projects

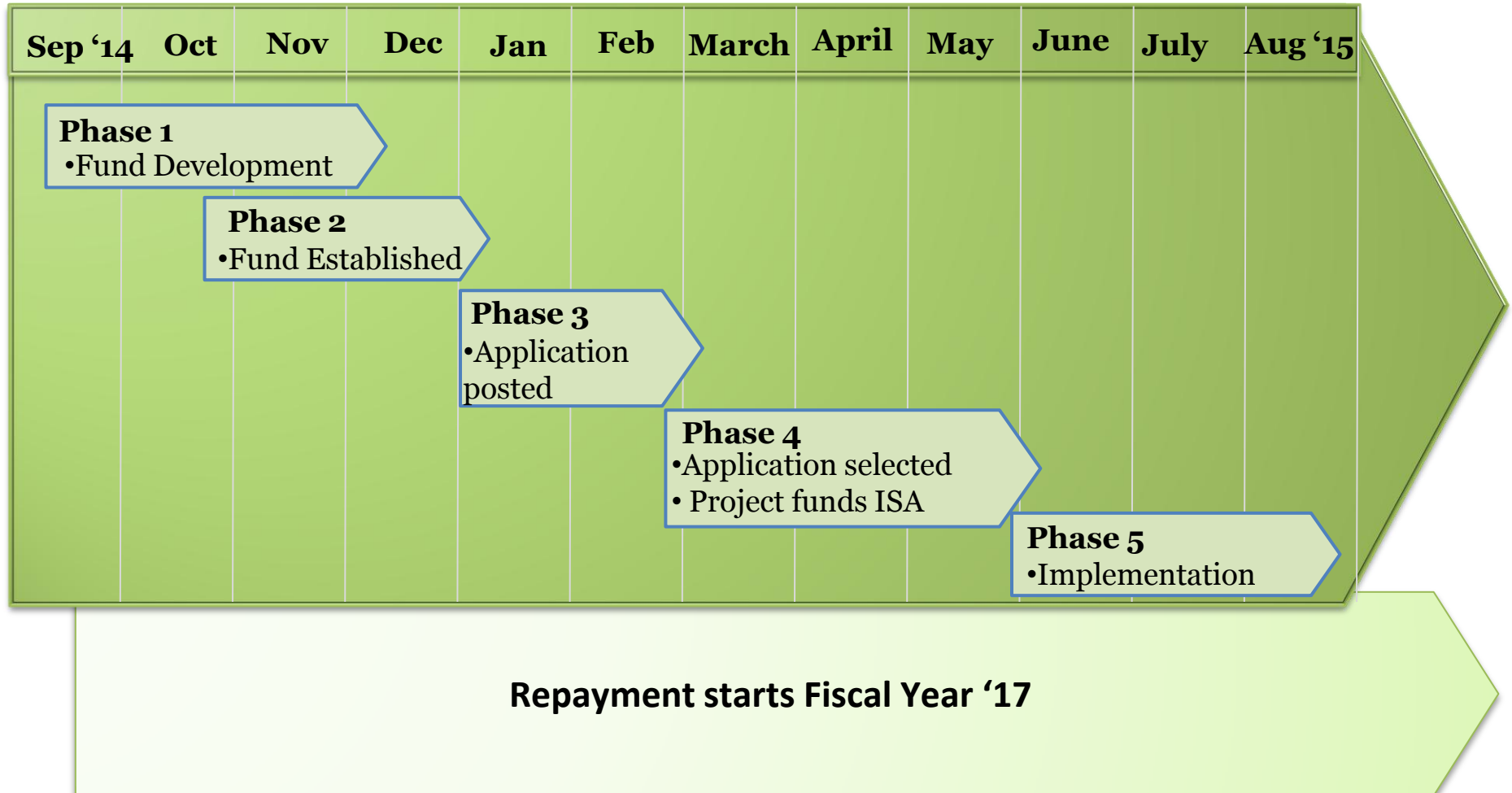
### Sustainable

- Self-replenishing through savings
- Reinvestment of the repayments in new efficiency projects
- Leverage \$ millions in project funds

### Accountable

- Reduce costs, utility usage and environmental impacts.
- Accountable with checks and balance
- Provides educational value and easily replicable

# Project Timeline





## CoFFEE Eligible Projects

### Energy Conservation Measures

Lighting Upgrades and delamping

Building Envelop Improvement

Heating, Ventilation and Air Conditioning replacements and upgrades

Energy Management Systems Upgrades

Retro-Commissioning

Renewables

Insulation

Domestic Water

Other energy and water efficiency projects

# Project Selection Criteria

Criteria	Description	Weighting
Payback Period	Time it takes saving to cover project costs	35%
Total Resource Benefit	Monetary value of energy savings	20%
Confidence/Timing	Feasibility and likelihood of success	20%
Non-energy Benefits	Reduced lifecycle costs, productivity benefits, improve aesthetics	15%
Education Value & Innovation	Project exposure, education benefits innovative measures	10%



## For more information, contact:

- **Ryan Harold** Program Manager
- [ryan.harold@state.ma.us](mailto:ryan.harold@state.ma.us)
- 857-204-1449
- **MASS.GOV/DCAMM**
- Updates will be sent out on AEP Interested Parties and other list-serves
- Application will be available **January 2015**

# Communications

# Sustainability Challenge

- Challenges state facilities and campuses to implement no and low cost changes to reduce the environmental impacts of state operations to promote sustainable practices
- Challenges presented in 10 categories
- Seeking beta testers



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**MASSACHUSETTS  
LEADING BY  
EXAMPLE  
PROGRAM**  
PUBLIC LEADERSHIP  
STEWARDSHIP COMMITMENT

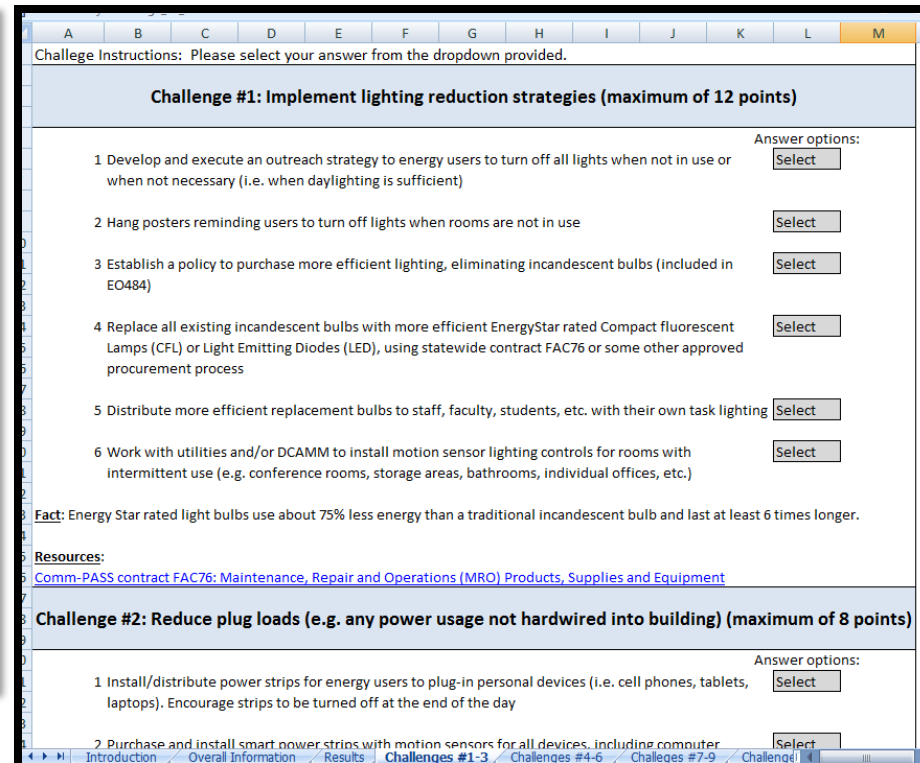
**Massachusetts Leading by Example  
2015 Sustainability Challenge**

This challenge is intended to rate and challenge agencies and campuses to promote more sustainable practices among staff, faculty, and students across Massachusetts agencies and campuses as a way of measuring performance. This form challenges state facilities to implement a series of relatively simple no and low cost changes that can be made in offices, classrooms, and all types of facilities that will ultimately support efforts to reduce the environmental impacts associated with state operations.

The following pages are organized into 10 categories, with a series of recommended strategies in each. Challenge categories range from energy efficiency, to paper reduction, to recycling, to environmentally preferable purchasing. Facilities are being asked to review every recommended strategy, check off the ones that are already in place, and initiate a process to implement as many of the remaining recommendations as possible. The strategies suggested here address facility occupant behaviors operations & maintenance, and easy to procure equipment.

Facilities and agencies will be asked to submit a completed form at the end of each fiscal year and will be scored based on the responses and point system outlined in this document. Agencies receiving a certain number of points will be acknowledged and receive additional value when applying for LBE grants, an LBE award, and other efforts administered by the LBE program. Please note any items on the Challenge checklist that are not applicable for certain facility types; agencies/facilities will not be penalized for measures that are not applicable.

Many of the suggested strategies are already required by Executive Order 484 (Leading by Example) and Executive Order 515 (Environmental Purchasing), and should be prioritized by agencies if they are not yet in compliance with these provisions.



Challenge Instructions: Please select your answer from the dropdown provided.

**Challenge #1: Implement lighting reduction strategies (maximum of 12 points)**

Answer options:

- Develop and execute an outreach strategy to energy users to turn off all lights when not in use or when not necessary (i.e. when daylighting is sufficient)
- Hang posters reminding users to turn off lights when rooms are not in use
- Establish a policy to purchase more efficient lighting, eliminating incandescent bulbs (included in EO484)
- Replace all existing incandescent bulbs with more efficient EnergyStar rated Compact fluorescent Lamps (CFL) or Light Emitting Diodes (LED), using statewide contract FAC76 or some other approved procurement process
- Distribute more efficient replacement bulbs to staff, faculty, students, etc. with their own task lighting
- Work with utilities and/or DCAMM to install motion sensor lighting controls for rooms with intermittent use (e.g. conference rooms, storage areas, bathrooms, individual offices, etc.)

**Fact:** Energy Star rated light bulbs use about 75% less energy than a traditional incandescent bulb and last at least 6 times longer.

**Resources:**  
[Comm-PASS contract FAC76: Maintenance, Repair and Operations \(MRO\) Products, Supplies and Equipment](#)

**Challenge #2: Reduce plug loads (e.g. any power usage not hardwired into building) (maximum of 8 points)**

Answer options:

- Install/distribute power strips for energy users to plug-in personal devices (i.e. cell phones, tablets, laptops). Encourage strips to be turned off at the end of the day
- Purchase and install smart power strips with motion sensors for all devices, including computer

Introduction Overall Information Results **Challenges #1-3** Challenges #4-6 Challenges #7-9 Challenge #10

Contact: [trey.gowdy@state.ma.us](mailto:trey.gowdy@state.ma.us)

*Creating A Cleaner Energy Future For the Commonwealth*

Massachusetts Department  
of Energy Resources

# Guest Blogs

- LBE collaborated with, DCR Commissioner Jack Murray for Energy Smarts blog
- Seeking guest blog posts to highlight projects from LBE partners

Contact: [trey.gowdy@state.ma.us](mailto:trey.gowdy@state.ma.us)



## Energy Smarts

Working to create a cleaner energy future for Massachusetts

### New Walden Pond Visitor Center Would Inspire Even Thoreau

Home / Energy Efficiency / New Walden Pond Visitor Center Would Inspire Even Thoreau

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2014

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Henry David Thoreau's famous sojourn on the shores of Walden Pond in the 1840s inspired awareness of America's precious natural resources and marked the birth of the conservation movement. Now a National Historic Landmark, the pond and its surrounding woods continue to foster in visitors a deep connection with nature and a sense of responsibility to protect it. Today the 335 acre [Walden Pond State Reservation](#) annually attracts 500,000 people from all over the world, who journey here not just for recreation but for inspiration.



Those visitors will soon have another amenity to enjoy. Earlier this month, Governor Deval Patrick joined community leaders, other public officials, environmentalists and project partners to break ground on the [Department of Conservation and Recreation's](#) new \$8 million [Walden Pond Visitor Center](#), designed to incorporate a wide-range of sustainable materials and technologies.

The center is slated to be a [Zero Net Energy Building \(ZNEB\)](#), a building designed to produce as much energy as it consumes over the course of a year. To accomplish this, the 5,600 square foot building will deploy various energy reduction strategies and innovative technologies, including extensive wall and attic insulation, high efficiency windows, LED lighting, a solar

domestic hot water system, cold climate air source heat pumps and a 100 kW solar PV canopy over two of its parking lots. The canopy is projected to produce over 115,000 kWh each year, more than enough to offset the building's estimated 79,000 kWh of annual demand.

Additional sustainability design elements include natural cross-ventilation, recycled building materials, low and no VOC paints and finishes, and the use of locally manufactured and sourced wood materials for exterior siding, decking, framing and flooring.

Governor Patrick said it is fitting that the new center is being built with energy efficiency in mind and powered by green technology. "As the birthplace of the conservation movement, Walden Pond is an important natural landmark for the Commonwealth and nation," he said. "These improvements are about good stewardship for this generation and the next."

DCR has received support from key partners in this project, including the Massachusetts Legislature for project funding, the Walden Advisory Board, Thoreau Society, Walden Woods Project, and Concord Municipal Light Plant, the local utility. In addition, DCR received more than \$300,000 in Leading by Example and Zero Net Energy grants from the

help make this project



Proposed Visitor Center Design

tive exhibit, public restrooms and a bookstore, as well as offices and

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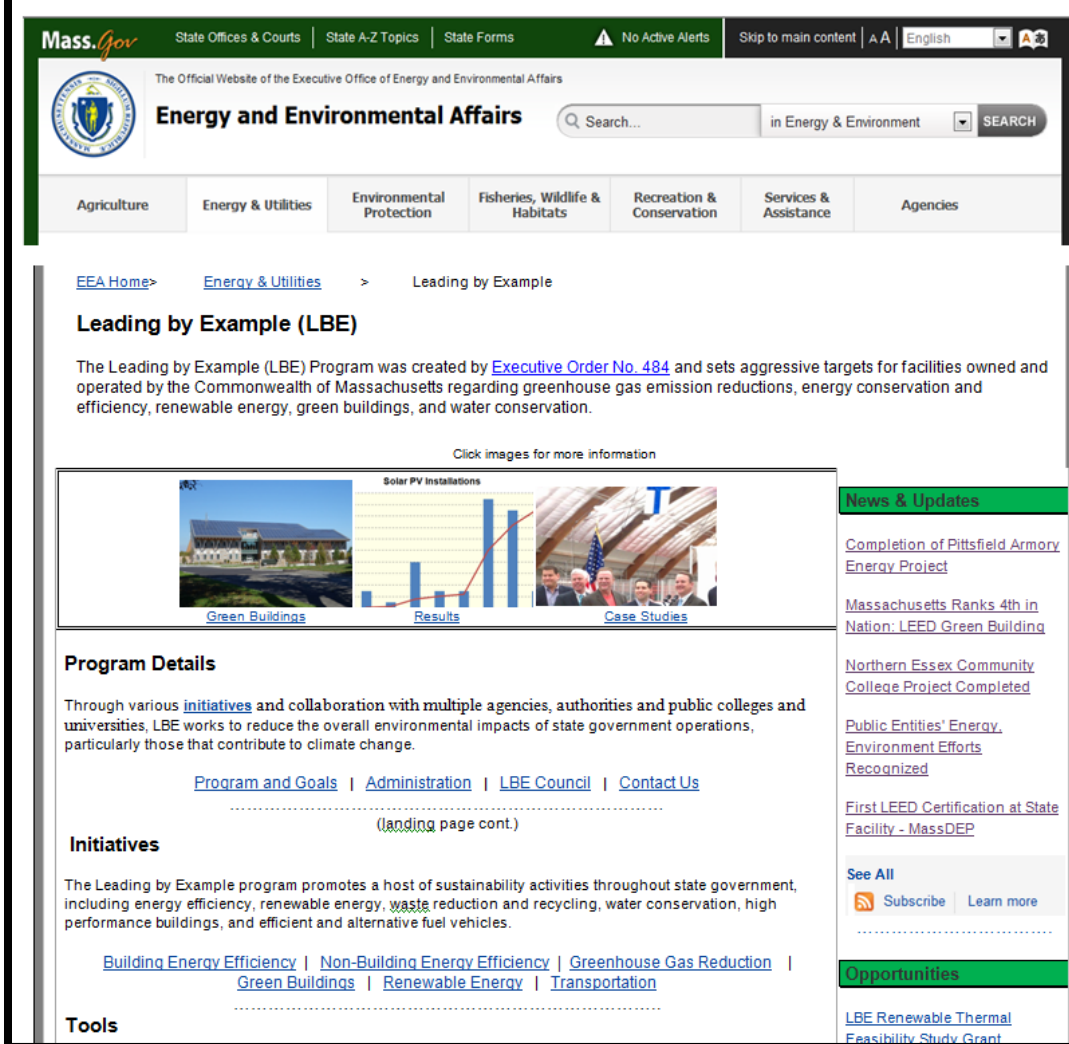
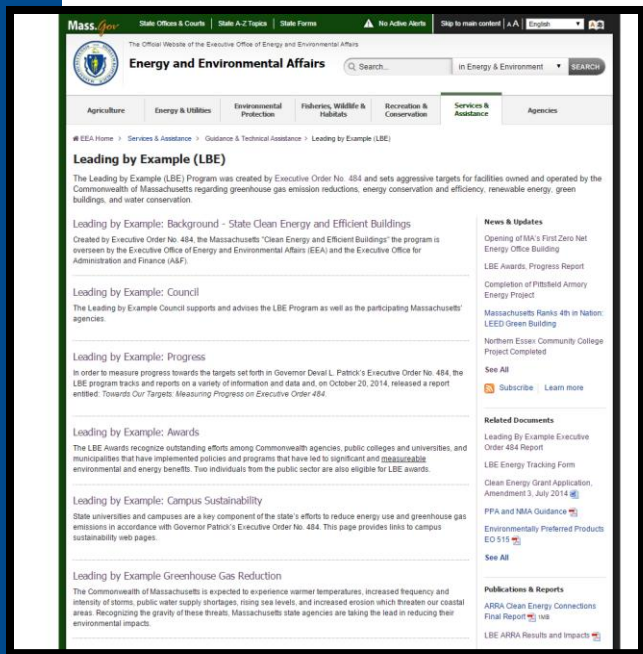
# Webinars

- Fuel Efficiency Standard
  - Thursday, February 5<sup>th</sup> – 11:30 – 1:00pm
- Solar PV Canopies
  - February TBD
- Renewable Thermal Alternative Portfolio Standards
  - Spring/Summer 2015



More information/RSVP:  
[charles.tuttle@state.ma.us](mailto:charles.tuttle@state.ma.us)

# LBE Website



- Updates will include:
  - Metrics Page
  - DOER and LBE initiatives
  - Comprehensive list of resources
  - Updated layout

# DOER Clean Energy Dashboard

## Clean Energy Progress

Green Communities

Energy Efficiency

Renewable Energy

RPS  
Renewable Energy  
Portfolio Standard

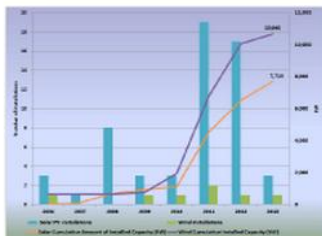
RGGI  
Regional  
Greenhouse  
Gas Initiative

Clean Energy in  
State Facilities

Alternative  
Transportation

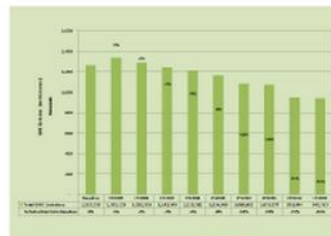
Rankings  
Progress

## Clean Energy in State Facilities



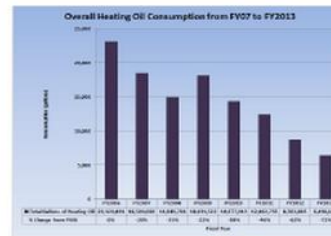
Renewable Installations &  
kW since FY 2006

[Click to see the full size image.](#)



Annual Change in GHG  
Emissions from Baseline Year

[Click to see the full size image.](#)



Overall Heating Oil  
Consumption FY07-FY2013

[Click to see the full size image.](#)

The [Leading by Example \(LBE\) Program](#) is a collaborative effort that encompasses all of Massachusetts' executive agencies and public institutions of higher education, accounting for 70 million square feet of buildings and 8,000 vehicles. It is charged with reducing energy use and greenhouse gas emissions and increasing renewable energy use across the state building portfolio.

Source Data: [2014 Leading By Example Progress Report](#) 3MB [next](#) / [previous](#) / [menu](#)

for the Commonwealth



Massachusetts Department  
of Energy Resources

# Lyman Estate

## Deep Energy Retrofit Overview

# Lyman Estate Weatherization Project

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# Project Background

- Massachusetts Department of Energy Resources
  - Architectural Heritage Foundation
  - Trustees of the Reservations
  - Historic New England: \$311,000
- Goal: Reduce Energy Consumption by 50%!

# What We Did – Conserved Windows



# What We Did – Installed Storm Windows



# What We Did – Air Sealing and Insulation



# What We Did – New HVAC



# Heating Component

- Change from oil to natural gas
- Four condensing, modulating gas furnaces / heat pumps
- Room level zone controls
- Pre-work – 429 MMBTU (2009/2010)
- Post-work – 175 MMBTU (2012-2014)

59% reduction

Doubled utilization (Nov – Apr)

# Electricity Component

- Newer air conditioning / heat pump technology
- Room level zone controls
- LED and CFL lighting
- Pre-work – 221 MMBTU (2009/2010)
- Post-work – 172 MMBTU (2012-2014)

22% reduction (overall)

68% increase in utilization (May – Oct)

40% reduction on a per event basis

# Energy Metrics

- Pre-work – 2009/2010
  - Average of 650 MMBTU
- Post-work
  - 2012 – 310 MMBTU (52% reduction)
  - 2013 – 360 MMBTU (45% reduction)
  - 2014 – 370 MMBTU (43% reduction)
  - Average of 347 MMBTU

47% reduction